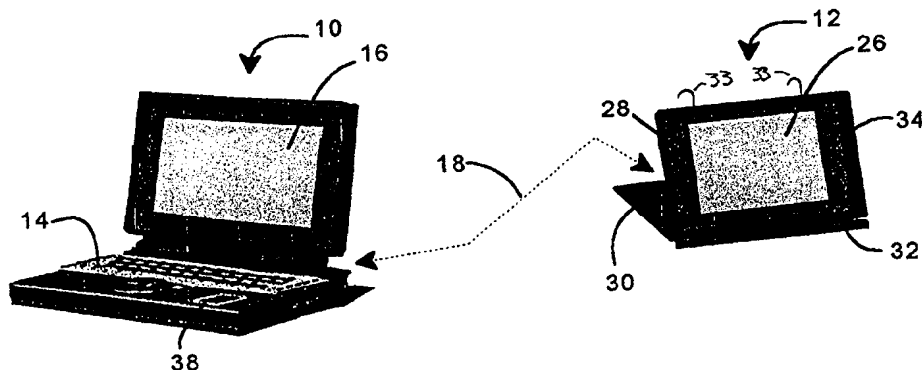




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : G06F 3/14	A1	(11) International Publication Number: WO 00/25199 (43) International Publication Date: 4 May 2000 (04.05.00)
(21) International Application Number: PCT/US99/25098 (22) International Filing Date: 26 October 1999 (26.10.99) (30) Priority Data: 09/179,624 27 October 1998 (27.10.98) US (71)(72) Applicant and Inventor: PETERSEN, Joel, R. [US/US]; 4N 912 Greenwood Lane, St. Charles, IL 60175 (US). (74) Agent: MCCracken, William, E.; Marshall, O'Toole, Gerstein, Murray & Borun, 6300 Sears Tower, 233 S. Wacker Drive, Chicago, IL 60606 (US).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: PORTABLE INTERACTIVE PRESENTATION DEVICE**(57) Abstract**

A portable interactive presentation device typically connected to a computing device is provided. The computing device includes one or more user input devices and a graphical display. The computing device is coupled to the portable interactive presentation device via a bi-directional link. The bi-directional link facilitates transmitting display signals from the computing device and receiving the display signals at the presentation device. Further, the bi-directional link facilitates transmitting user input signals from the presentation device and receiving the user input signals at the computing device. Display signals received by the presentation device are processed by a converter and displayed on a presentation display. The presentation display is preferably mounted in a housing and a portion of the housing or a separate component coupled to the housing may be used as a means for orienting the presentation device. Audience member(s) interact with the presentation device through the use of an ancillary input device located in the presentation device housing. During audience member interaction, multiple cursors may be employed to allow a presenter and one or more audience members to interact with the computing device display and/or the presentation display. Further, certain tiles of information appear on the computing device display and are optionally shown on the presentation display. Similarly, certain tiles of information may appear on the presentation display and that are optionally shown on the computing device display.

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PORTABLE INTERACTIVE PRESENTATION DEVICE

TECHNICAL FIELD OF THE INVENTION

The present invention relates in general to portable interactive presentation devices and, in particular, to a portable graphical display and
5 associated ancillary input device for use in conjunction with a computing device.

BACKGROUND OF THE INVENTION

Frequently presenters need to display information to one or more audience members. However, the information often resides on the
10 presenter's personal computer (PC) and is therefore most conveniently viewed on the display coupled to the PC. For example, a salesperson may want to present a computerized slideshow to a potential customer. Further, the presenter often desires feedback from one or more audience members. For example, a presenter may ask an audience member to select a product
15 from a list. Subsequently, more information about the selected product could be displayed.

Several approaches to displaying information and acting on feedback are commonly employed. Each slide in a presentation may be printed on paper and distributed to each audience member. Similarly, each slide may be printed on a transparency and projected using an overhead projector. When specific questions arise that may be better answered by another slide, the presenter directs everyone to turn to the appropriate page, and/or, the appropriate slide is displayed on the overhead projector. In some circumstances, a PC compatible projector is available. For example, a liquid crystal display (LCD) projector may be used. In such an instance, the presenter's PC may be connected directly to the projector which then projects the presentation information onto a screen. Interaction with the presentation may be accomplished via the PC. Other times, each audience member gathers around the display coupled to the PC and/or an auxiliary display connected to the PC (e.g., a large cathode ray tube) to view the presentation.

Each of these prior art approaches possesses certain drawbacks. Paper and transparency printouts lack the interactive and animated qualities of a typical computerized presentation. Further, transparencies require the availability of an overhead projector. Overhead projectors and screens are often unavailable or inconvenient. Further, projectors and screens are cumbersome to transport. Use of a PC compatible projector allows for animation, but only limited feedback. Any interaction (e.g., selecting items from lists) must be communicated to an

operator (typically the presenter). Further, a PC compatible projector displays the same information to the presenter and the audience. Often it is desirable to hide certain information such as price lists, presentation notes, presentation controls, and upcoming slides. Still further, a PC compatible
5 projector also requires the availability of an overhead projector.

SUMMARY OF THE INVENTION

In accordance with a first aspect of the invention, a portable interactive presentation device for use in conjunction with a computing device is provided, the computing device having a first graphical display and
10 one or more input devices. The presentation device comprises a receiver for receiving display signals from the computing device and a converter for converting the display signals into a graphical representation. A housing and a second graphical display are mounted in the housing for presenting the graphical representation. A battery is coupled to the receiver, converter, and
15 second graphical display.

Preferably, the receiver comprises an infrared or radio receiver. Also preferably, the converter comprises an LCD display driver. Further, the housing may comprise an injected molded plastic housing and the second graphical display may be a liquid crystal display.

20 In the preferred embodiment, the device further comprises an ancillary input device mounted in the housing for converting inputs from a user into a signal and a transmitter for transmitting the signal to the computing device. The ancillary input device may comprise one or more of

the group consisting of a touch sensitive covering on the second graphical display; a stylus; a track point; a track ball; a keyboard; and a button. In some embodiments, the transmitter comprises an infrared or radio transmitter.

5 Still further, the device may further include a cursor controller associated with the computing device for displaying and controlling a first cursor on the first graphical display and a second cursor on the second graphical display. In such an instance, the cursor controller may also display the first cursor on the second graphical display and/or the second cursor on
10 the first graphical display. Preferably, the cursor controller comprises software instructions executed by a microprocessor.

 In the preferred embodiment, the device further includes a tile controller associated with the computing device for displaying and controlling a first tile on the first graphical display and a second tile on the second
15 graphical display. In this case, the tile controller may also display the first tile on the second graphical display and/or the second tile on the first graphical display. Preferably, the tile controller comprises software instructions executing in a microprocessor.

 Also according to the preferred embodiments, the device further
20 comprises means coupled to the housing for orienting the presentation device. In such an instance, the orienting means may comprise an adjustable stand or fasteners for connecting the presentation device to the first graphical display. Further, in such an instance, the adjustable stand may

rotate though an angle greater than 270 degrees to protect the second graphical display.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features and advantages of the present invention will become more apparent from a detailed consideration of the following detailed description of certain preferred embodiments when taken in conjunction with the drawings in which:

FIG. 1 is a perspective view of a personal computer coupled to a portable interactive presentation device of the present invention;

FIG. 2 is a block diagram showing the presentation device of FIG 1;

FIG. 3 is a block diagram showing multiple display elements on a computing device display and a presentation device display;

FIG. 4 is a flowchart illustrating a program for controlling the display of a tile; and

FIG. 5 is a flowchart illustrating a program for controlling the display of a pointer.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although the following description focuses on a portable interactive display connected to a portable personal computer, persons of ordinary skill in the art will readily appreciate that the techniques of the

present invention are in no way limited to portable personal computers. On the contrary, any system which might benefit from a portable interactive presentation device may employ the techniques shown herein. Such systems might include desktop computers and personal digital assistants.

5 A block diagram of a computing device 10 (e.g., a personal computer) coupled to a portable interactive presentation device 12, capable of utilizing the present invention, is illustrated in FIG. 1. The computing device 10 typically includes one or more user input devices 14 such as a keyboard and a mouse or mouse equivalent (e.g., a stylus, a track point
10 and/or a track ball). These user input devices 14 are used to interact with the computing device 10. Further, the computing device 10 typically includes a graphical display 16 such as a liquid crystal display (LCD) or a cathode ray tube (CRT). The computing device display 16 is used to present information to a user. For example, presentation software (e.g., Microsoft
15 PowerPoint®) may be used to present slides of information to an audience. A person operating the presentation software may direct the presentation software to advance to a next slide of information by pressing a button on the keyboard or using the mouse to move a cursor over a virtual button and then pressing a mouse button. The user input devices 14, any presentation
20 software or other applications, and the graphical display 16 are all preferably controlled/executed by a microprocessor 38 residing in the computing device 10.

In a preferred embodiment of the present invention, the computing device 10 is coupled to the portable interactive presentation device 12 via a bi-directional link 18. The bi-directional link 18 preferably interconnects a transmitter associated with the computing device 10 to a receiver 20 (see FIG. 2) associated with the presentation device 12 for transmitting and receiving display signals from the computing device 10 to the presentation device 12. Further, the bi-directional link 18 preferably connects a transmitter 22 associated with the presentation device 12 to a receiver associated with the computing device 10 for transmitting and receiving user input signals from the presentation device 12 to the computing device 10.

The bi-directional link 18 may be wired or wireless, and may comprise one or more physical connections. For example, a cable may connect a bus on the computing device 10, such as a Universal Serial Bus, to the presentation device 12. Accordingly, the cable would carry display signals from the computing device 10 to the presentation device 12 as well as user input signals from the presentation device 12 back to the computing device 10. Alternatively, two cables may be used. A first cable may connect a monitor output port on the computing device 10 to a monitor input port on the presentation device 12. A second cable may connect a serial port on the presentation device 12 to a serial port on the computing device 10. The first cable would supply display signals from the computing device to the presentation device 12. The second cable would supply user input

signals from the presentation device 12 back to the computing device 10.

In an alternate embodiment, wireless signals such as infrared signals or radio signals may be used to interconnect a transmitter on the computing device 10 to a receiver on the presentation device 12, or vice versa. Once the

5 display signals are received by the receiver 20 associated with the presentation device 12, they are processed by a converter 24. The converter 24 may decode digital signals and/or perform any necessary translation of analog signals to derive a graphical representation suitable for a graphical display 26 associated with the presentation device 12. In a preferred
10 embodiment, the converter 24 comprises an integrated circuit LCD display driver, which is a well-known circuit to persons of ordinary skill in the art.

The presentation display 26 is preferably an LCD display mounted in a housing 28 such as an injected molded plastic housing. Further, a portion of the housing 28 or a separate component coupled to the
15 housing 28 may be used as a means for orienting the presentation device 12. The orienting means may comprise an adjustable stand, a base 30 coupled to a hinge 32 wherein the viewing angle of the presentation display 26 relative to the base 30 may be adjusted by pivoting the presentation display 26 about the hinge 32. In a preferred embodiment, the orienting means
20 rotates through an angle of 270 degrees or more so that the base 30 may further function as a protective cover for the presentation display 26. In an alternate embodiment, the orienting means comprises one or more fasteners 33 coupled to the presentation device 12 for connecting the presentation

device 12 to the computing device display 16. For example, one or more hooks 33 coupled to the housing 28 could be used to connect the presentation device 12 to the back of the computing device display 16.

An audience member interacts with the presentation device 12 through the use of an ancillary input device 34. The ancillary input device 34 may be a touch sensitive covering on the presentation display 26, a stylus, a mouse, a track point, a track ball, a keyboard, and/or a button or any other user input device. Preferably, the ancillary input device 34 is mounted in the housing 28. The ancillary input device 34 converts inputs from a user (i.e., an audience member) into a signal. For example, a touch sensitive covering and associated circuitry may convert the pressure or capacitance of the user's finger and/or a stylus into a digital signal representing an x,y coordinate. The signal may then be sent to the computing device 10 via the presentation device transmitter 22 and the computing device receiver. The signal may then be used to operate an on-screen control and/or display a pointer or other icon at a location on the computing device display 16 and/or the presentation device 26 determined by the x,y coordinate.

In a preferred embodiment the receiver 20, converter 24, presentation display 26, ancillary input device 34, and transmitter 22 are all coupled to a portable power source 36 such as a battery. By supplying the presentation device 12 with a battery, the device is more portable and less constrained by additional wires.

In a preferred embodiment, the computing device display 16 and the presentation display 26 show some of the same information and some different information. Preferably, each display illuminates display elements, such as "tiles", cursors, icons, etc...and some display elements are shown in both displays while the remaining display elements are shown on only one of the displays (e.g., a window in Microsoft Windows®). The display elements are preferably controlled (e.g., displayed, hidden, moved, etc.) by the microprocessor 38 associated with the computing device 10. Although the following description focuses on two tiles of information and two cursors, persons of ordinary skill in the art will readily appreciate that any number of display elements may be shown on either or both displays 16,26 in the spirit of the present invention.

In the example shown in FIG. 3, the computing device display 16 shows a presenter tile 40a. The presenter tile is optionally displayed on the presentation display 26 as optional presenter tile 40b. For example, the main presenter tile 40a may contain a list of product costs that a salesman/presenter does not wish to divulge to an audience. However, the salesman/presenter may want to have the cost information available on the computing device display 16 for his own reference. On the other hand, the main presenter tile 40a may contain a product specification. In such an event, the salesman/presenter may wish to hide the information on the presentation display 26 temporarily when it is not relevant to the discussion, yet have it available for his own reference and/or standing by to be displayed

on the presentation display 26 if and when it does become relevant to the discussion.

Similarly, the presentation display 26 shows an audience tile 44b. This tile of information is optionally displayed on the computing device display 16 as optional audience tile 44a. For example, the audience tile 44b may contain a slide of information. In some instances the presenter may prefer to work exclusively with an outline containing the same bullets as the slide, but annotated with his presentation notes. This method conserves screen space on the computing device display 16 and better integrates the presenter's notes with the presented information. At other times the presenter may wish to view an exact copy of the information he is presenting. Of course, the duplicate version 40b, 44a could be reduced in size to conserve screen space.

A flowchart of a program that can be implemented by the computing device 10 to display a tile of information in accordance with the teachings of the present invention is illustrated in FIG. 4. The programmed steps are typically performed by a control circuit such as the microprocessor 38 as is conventional. As discussed above, multiple tiles of information may be displayed. Accordingly, multiple instances of the program illustrated in FIG. 4 may be executed to control the display of multiple tiles of information (i.e., this flowchart handles one tile of information). Once the program is initiated the control circuit loops until one of three commands has been issued (blocks 50, 52, and 54). A command may be issued by the presenter

via the computing device, an audience member via the presentation device 12, and/or another software component executing on the same microprocessor 38 or on another microprocessor. Once a command is detected, the appropriate processing occurs as discussed below.

5 If the control circuit determines that a command to update the contents of the tile has been issued (block 50), then the control circuit determines the current display status (for this one tile only) on the first display. In this example, the first display is arbitrarily chosen to be the computing device display 16 and the second display is arbitrarily chosen to be the presentation display 26. The status is preferably a binary value representing either "show" or "hide". If the current computing device display 16 status (i.e., current display 1 status) is representative of "show" (block 56), then the control circuit redraws the tile on the computing device display 16 (block 58). If the current computing device display 16 status is representative of "hide" (i.e., not equal to "show" - block 56), or, the control circuit redraw the tile on the computing device display 16 (block 58), then the control circuit determines the current display status for this tile on the second display (e.g., the presentation display 26). If the current presentation display 26 status (i.e., current display 2 status) is representative of "show" (block 60), then the control circuit redraws the tile on the presentation display 26 (block 62). If the current presentation display 26 status is representative of "hide" (i.e., not equal to "show" - block 60), or, the control

circuit redraw the tile on the presentation display 26 (block 62), then control circuit returns to the command finding loop (blocks 50, 52, and 54).

If the control circuit determines that a command to toggle the status of the computing device display 16 (i.e., display 1) has been issued (block 52), then the control circuit determines the current display status for this tile on the first display (block 64). If the current computing device display 16 status is representative of "show", then the control circuit changes the display status to "hide" (i.e., the control circuit toggles the status) and erases the tile on the computing device display 16 (block 66). However, if the status is "hide" it is toggled to "show" and the tile is drawn on the computing device display 16 (block 68). Subsequently, the control circuit returns to the command finding loop (blocks 50, 52, and 54).

Similarly, if the control circuit determines that a command to toggle the status of the presentation display 26 (i.e., display 2) has been issued (block 54), then the control circuit determines the current display status for this tile on the second display (block 70). If the current presentation display 26 status is representative of "show", then the control circuit changes the display status to "hide" (i.e., the control circuit toggles the status) and erases the tile on the presentation display 26 (block 72). However, if the status is "hide" it is toggled to "show" and the tile is drawn on the presentation display 26 (block 74). Subsequently, the control circuit returns to the command finding loop (blocks 50, 52, and 54).

Also illustrated in FIG. 3 are two cursors 42a and 46b (also called "presenter's" and "audience" cursors, respectively). In the preferred embodiment, the user input device(s) 14 associated with the computing device 10 operate in concert with the microprocessor 38 to control the operation and display of the presenter's cursor 42a. Similarly, the ancillary input device(s) 34 associated with the presentation device 12 operates in concert with the microprocessor 38 to control the operation and display of the audience cursor 46b. Typically, the presenter's cursor 42a is visible and active (able to operate on-screen controls such as buttons and menus) on the computing device display 16, and the audience's cursor 46b is visible and active on the presentation display 26 to the extent there are display elements on the display 26 capable of being activated or modified by the cursor 46b. Preferably, when a tile of information is on both displays as described above, both cursors are displayed and active at least within that shared tile as shown 42b, 46a.

A flowchart of a program that can be implemented by the computing device 10 to display a pointer in accordance with the teachings of the present invention is illustrated in FIG. 5. Again, the programmed steps are typically performed by a control circuit such as the microprocessor 38 as is conventional. As discussed above, multiple pointers may be displayed. Accordingly, multiple instances of the program illustrated in FIG. 5 may be executed to control the display of multiple pointers (i.e., this flowchart handles one pointer). Once the program is initiated the control circuit loops

until a command to update the position of the pointer is issued (block 80). Typically, a user operating an input device associated with the computing device 10 and/or the presentation device 12 initiates a well know control circuit which in turn initiates the command to update the position of the
5 pointer.

Once the command to update is detected (block 80), the control circuit determines if the pointer is within the boundaries defined by a tile with a first display status of "show" (block 82). Operating system routines to determine if the pointer is within the boundaries of the tile are well
10 known, and, the current display status is maintained by the tile controller as described above and shown in FIG. 4. If the control circuit determines that the pointer is in a tile shown on display 1, then the pointer is redrawn in its new position on display 1 (block 84). Once the pointer is redrawn on display 1 (if necessary), the control circuit determines if the pointer is within the
15 boundaries defined by a tile with a second display status of "show" (block 86). If the control circuit determines that the pointer is in a tile shown on display 2, then the pointer is redrawn in its new position on display 2 (block 88). Subsequently, the control circuit returns to the command finding loop (block 80).

20 In summary, persons of ordinary skill in the art will readily appreciate that a portable interactive presentation device has been provided. Systems implementing the teachings of the present invention can enjoy a

portable alternative to conventional display systems with the added benefit of user interactivity.

The foregoing description has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit
5 the invention to the precise form disclosed. Many modifications and variations are possible in light of the above teachings. It is intended that the scope of the invention be limited not by this detailed description, but rather by the claims appended hereto.

CLAIMS

What is Claimed is:

1. A portable interactive presentation device for use in conjunction with a computing device, the computing device having a first graphical display and one or more input devices, the presentation device
5 comprising:

a receiver for receiving display signals from the computing device;

a converter for converting the display signals into a graphical
10 representation;

a housing;

a second graphical display mounted in the housing for presenting the graphical representation; and,

a battery coupled to the receiver, converter, and second
15 graphical display.

2. A device as described in claim 1, wherein the receiver comprises an infrared receiver.

3. A device as described in claim 1, wherein the receiver comprises a radio receiver.

4. A device as described in claim 1, wherein the converter comprises an LCD display driver.

5. A device as described in claim 1, wherein the housing comprises an injected molded plastic housing.

5 6. A device as described in claim 1, wherein the second graphical display comprises a liquid crystal display.

7. A device as described in claim 1, further comprising:
an ancillary input device mounted in the housing and coupled to the battery for converting inputs from a user into a signal; and,

10 a transmitter coupled to the battery for transmitting the signal to the computing device.

8. A device as described in claim 7, wherein the ancillary input device comprises one or more of the group consisting of a touch sensitive covering on the second graphical display, a stylus, a track point, a
15 track ball, a keyboard, and a button.

9. A device as described in claim 7, wherein the transmitter comprises an infrared transmitter.

10. A device as described in claim 7, wherein the transmitter comprises a radio transmitter.

11. A device as described in claim 1, further comprising a cursor controller associated with the computing device for displaying and
5 controlling a first cursor on the first graphical display and a second cursor on the second graphical display.

12. A device as described in claim 11, wherein the cursor controller displays the first cursor on the second graphical display.

13. A device as described in claim 11, wherein the cursor
10 controller displays the second cursor on the first graphical display.

14. A device as described in claim 11, wherein the cursor controller comprises software instructions executing in a microprocessor.

15. A device as described in claim 1, further comprising a tile controller associated with the computing device for displaying and controlling
15 a first tile on the first graphical display and a second tile on the second graphical display.

16. A device as described in claim 11, wherein the tile controller displays the first tile on the second graphical display.

17. A device as described in claim 11, wherein the tile controller displays the second tile on the first graphical display.

5 18. A device as described in claim 11, wherein the tile controller comprises software instructions executing in a microprocessor.

19. A device as described in claim 1, further comprising means coupled to the housing for orienting the presentation device.

10 20. A device as described in claim 19, wherein the orienting means comprises an adjustable stand.

21. A device as described in claim 20, wherein the adjustable stand rotates through an angle greater than 270 degrees to protect the second graphical display.

15 22. A device as described in claim 19, wherein the orienting means comprises a fastener for connecting the presentation device to the first graphical display.

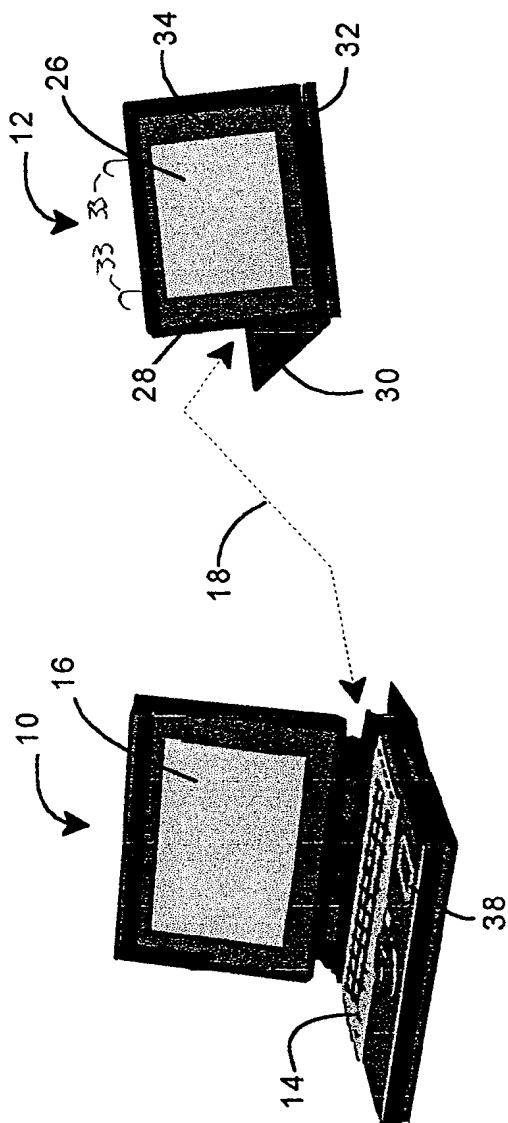


FIG. 1

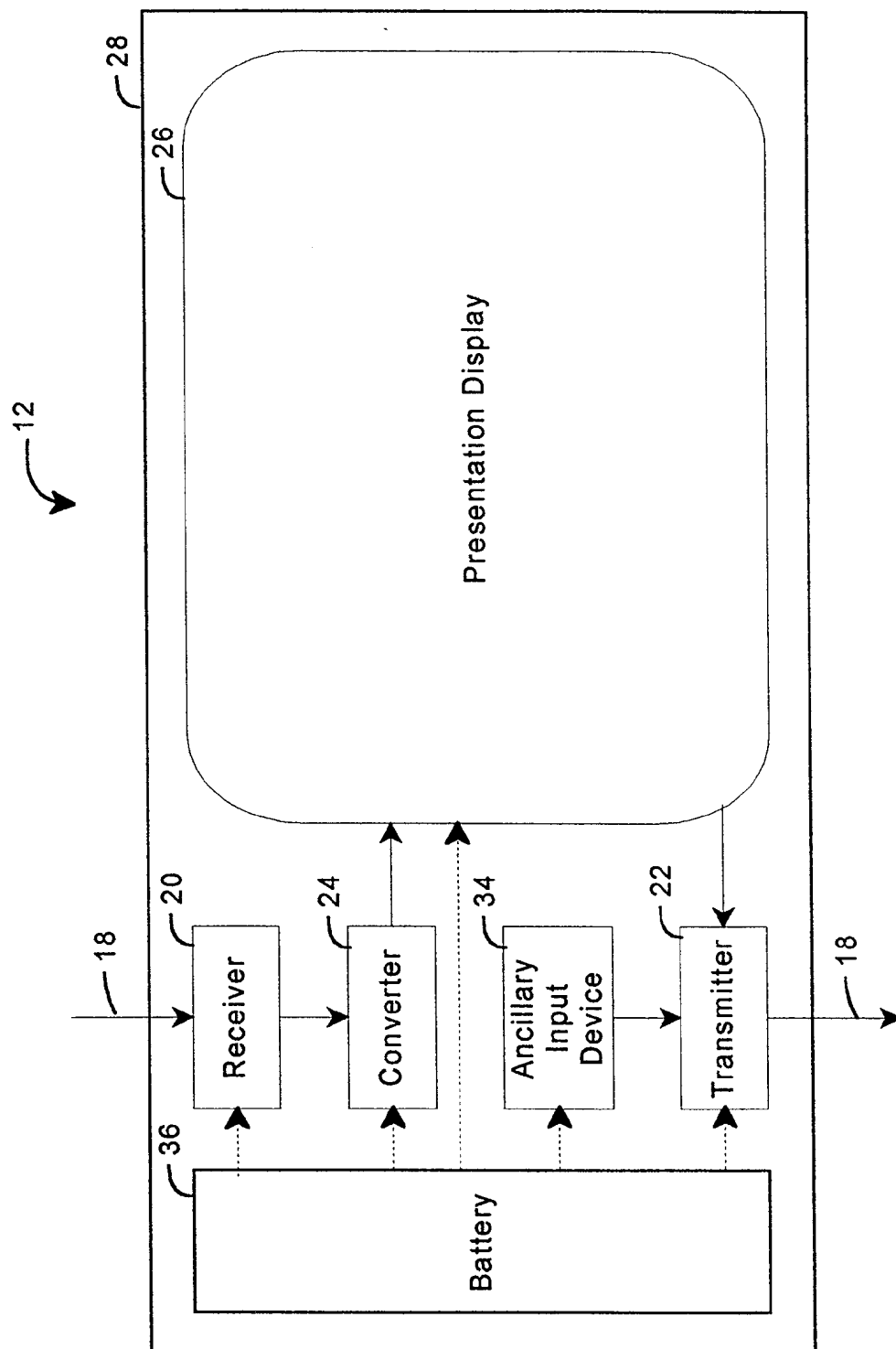


FIG. 2

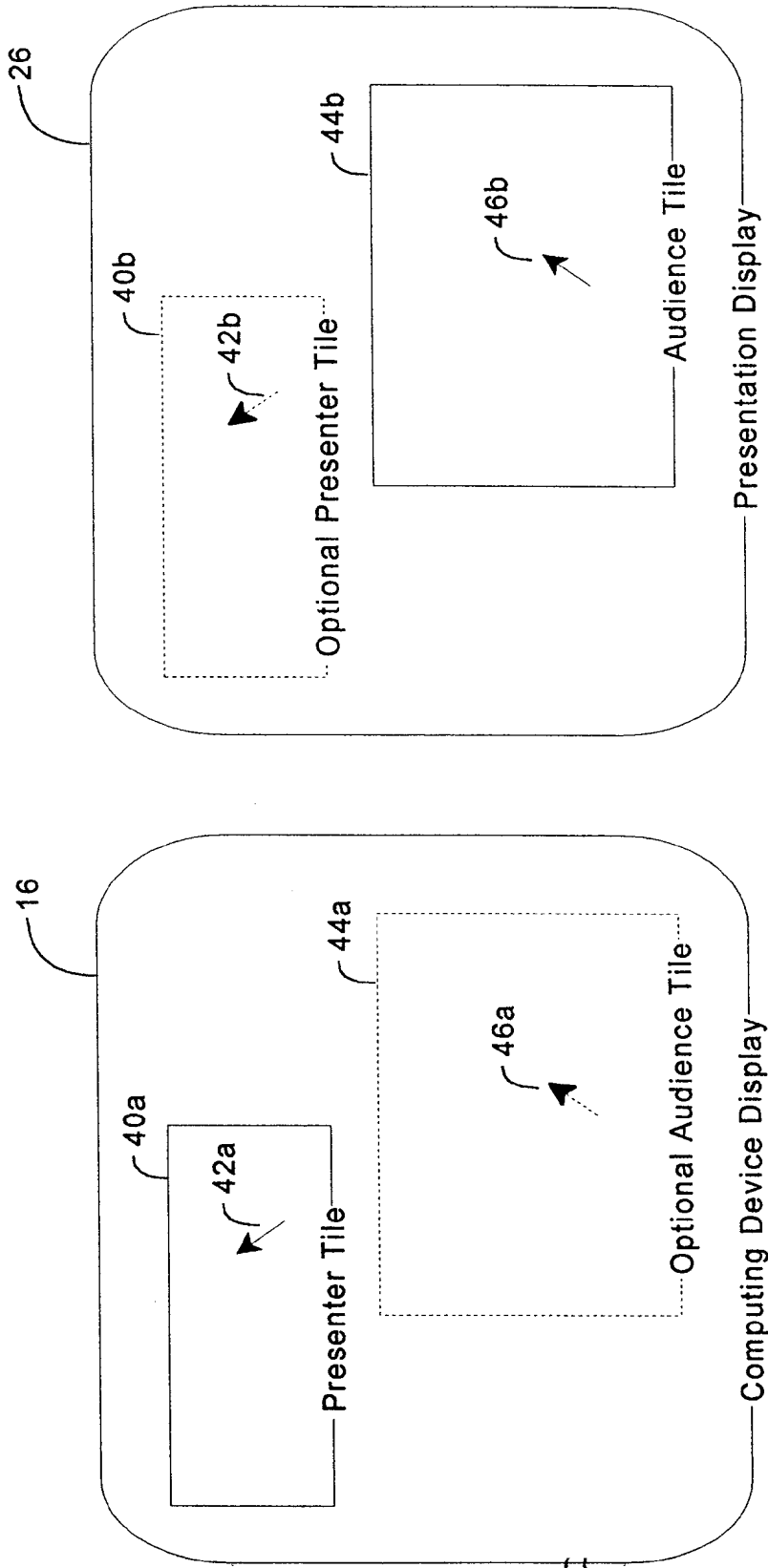


FIG. 3

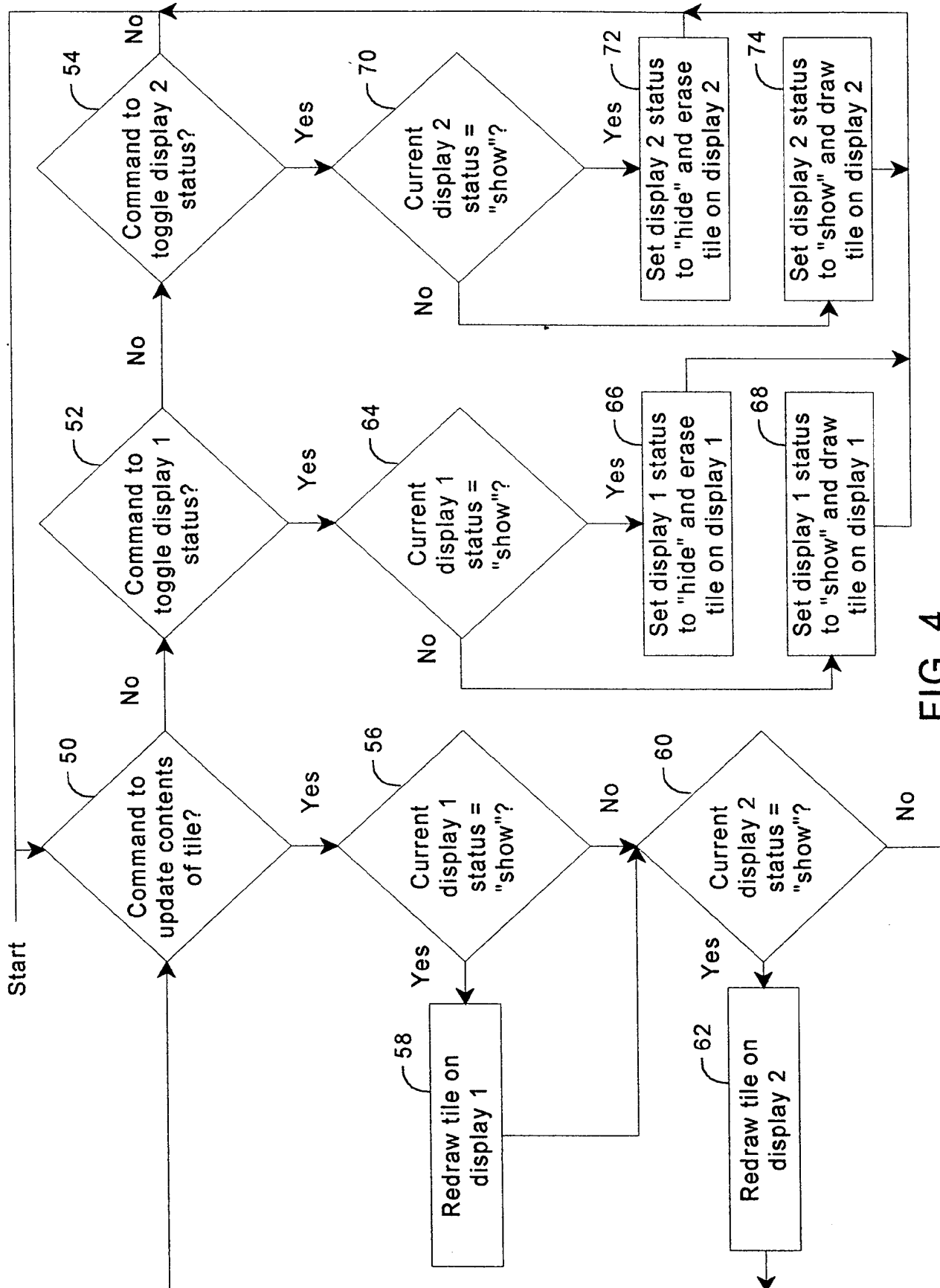


FIG. 4

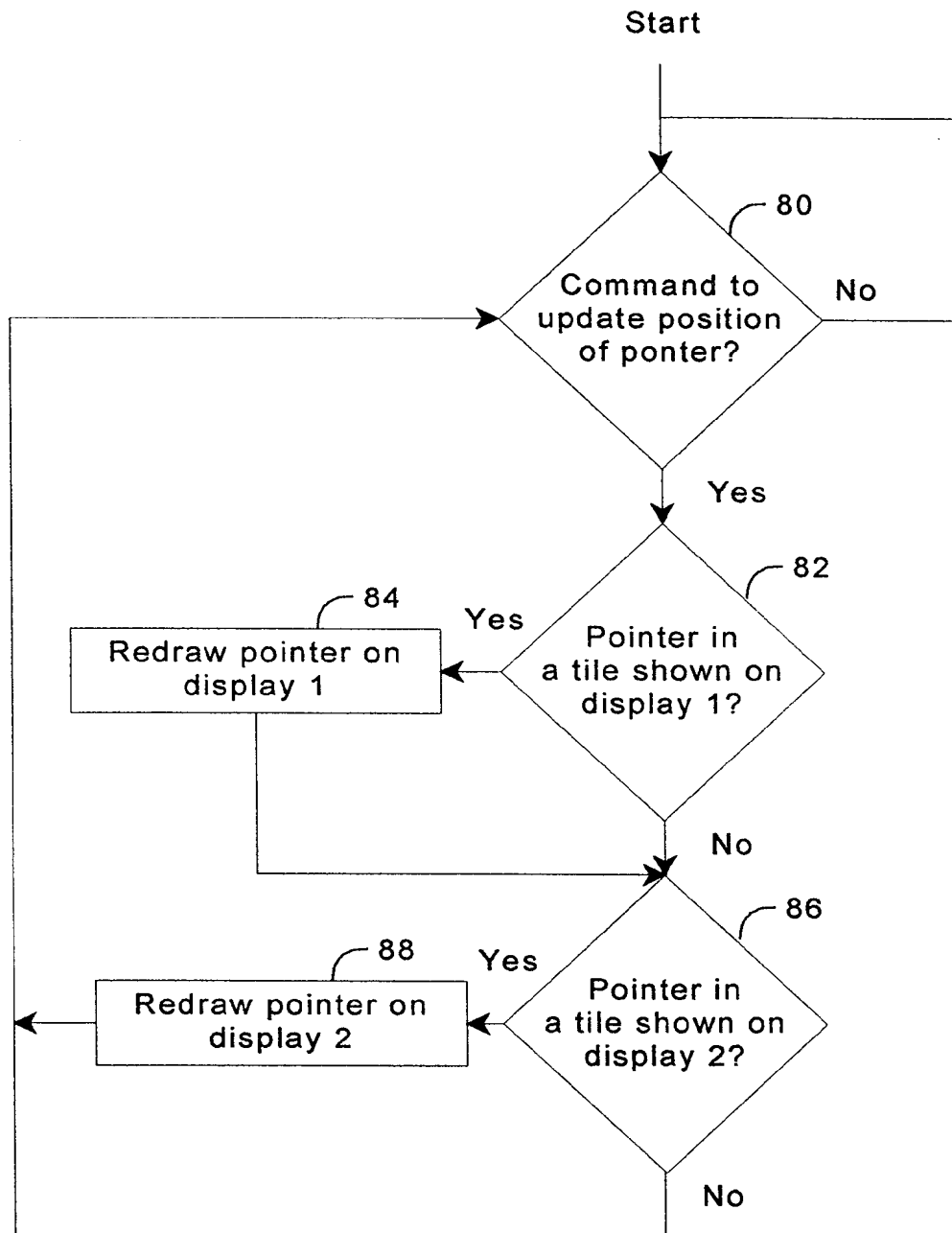


FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/25098

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G06F3/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F G09G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 12314 A (BELL COMMUNICATIONS RESEARCH INC.) 3 April 1997 (1997-04-03) page 3, line 29 -page 4, line 31 page 10, line 12 - line 16; figures 1-8 ----	1-10
X	WO 92 03816 A (GENERAL PARAMETRICS CORP.) 5 March 1992 (1992-03-05) page 7, line 3 -page 11, line 12; figures 1,8A,8B ----	1,4,6-8
A	----- US 5 917 470 A (FUJIOKA) 29 June 1999 (1999-06-29) column 5, line 22 -column 7, line 58; figures 1-3 ----- -/--	2,3,5,9, 10
P,A		1,4-8, 19-21

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

30 December 1999

Date of mailing of the international search report

12/01/2000

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/25098

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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